BELLCOMM, INC.
955 L'ENFANT PLAZA NORTH, S.W. WASHINGTON, D. C. 20024

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SUBJECT: "Space and the Spirit of Man"
Case 710

DATE: March 20, 1969

FROM: M. L. Kratage

## PREFACE

This paper was prepared as a non-technical appreciation of the manned space program. The space achievements of the last decade are placed in historical perspective and reviewed against the background of other bold ventures undertaken by man.

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MEMORANDUM FOR FILE

## I. FLIGHTS OF FANCY BECOME FACT

Primitive man gazed in awe at the skies and wondered. From the time he learned to make impressions on rock, he decorated his cave walls with crude designs of the celestial spheres of which he knew nothing. Today, with the planets at our finger tips and the moon within our grasp, it would seem that we have reached the end of a long journey into space. But the search for knowledge of the universe continues, for the conquest of the skies has just begun. Relying on the power of his intellect and the precision of his creations, man has embarked upon this most thrilling adventure, cosmic in scope, costly in terms of men and resources, yet all the more compelling because of the challenge presented therein.

History records the way in which mankind has been fascinated by the heavens above him. The ancient Egyptians believed that the sun god Aten brought them the gift of life, while the Chinese supposed that the universe had been fashioned with hammer and chisel by a dwarf named P'an Ku. The Greeks, particularly the Pythagoreans, thought the moon to be a separate world and speculated about its inhabitants. Naturally curious about the nature of the cosmos, man had a desire to explore the planets and beyond. "From the moment that he discovered himself earthbound he has been struggling to break the chains of bondage. Unable to solve the mystery of flight by physical means, he [first] attributed it to some super-natural power, a consummation to be gained in another world after death - something beyond him."(1)

Through the millenia since history began, science fiction writers and serious scientists alike have imagined space travel and speculated on ways to accomplish the feat. According to legend Icarus, the astronaut of Greek

mythology, ventured into the heavens aided by wings of feathers and wax. Drawing too near to the sun which melted the wax, he plunged to his death in the sea. Lucian, a Syrian writer of the second century A.D., relates the story of fifty men who were blown to the moon on a sailing ship. For years one could only dream and question. Then, with the findings of Galileo, Copernicus, Kepler and Newton a new view of the universe was created. Tales of space voyages, some based on sound scientific principle, appeared soon after and explained what one might encounter in an effort to explore the vast reaches of outer space. With the development of rockets in the twentiety century the moment arrived when Verneian fiction could become a reality. First, instruments were sent out to scout the "new ocean" of space and to relay back information. Animals followed in the list of travelers. Finally man, buoyant, exultant, triumphant, ventured up to survey the realm. Yet still he stands a pioneer, not conqueror of the interstellar domain.

## II. EXPLORATION AND DISCOVERY

Today, when the world is on the brink of the exploration of space, it may be worthwhile to consider why we have channeled our efforts in this direction. It is the author's hope that through an analogy between the Renaissance voyages of discovery and the space activities of the present day, we might better understand our involvement in this great endeavor and realize the significance which the space experience has for man. The comparison seems appropriate since both rank as important phenomena in terms of their impact on the modern world.

Let us recall that sea travel as such was not a novelty. The Phoenicians had been seafaring people in ancient times and the Greeks also. It is believed that the Scandinavians reached the shores of the North American continent long before Columbus. "What was novel about the period 1420-1620 was that travel was systematized by governments and merchant companies. From an age of sporadic, largely unsponsored, independent travel, Europe moved to a time of travel with a purpose, of exploration rather than individual globe-trotting"(2)

There was a very practical reason for this change. Sources for obtaining precious metals and spices were fast disappearing in Europe. It was imperative, then, that these necessities be procured outside the community. Without spices to preserve his food and metal to make into coin, the survival of Renaissance man and the development of his nation were put in question. Religious zeal provided another motive for exploration, for many genuinely believed it their mission to convert the heathen. Apparently no government was interested in exploration merely for the sake of knowledge, since enthusiasm for such enterprises decreased significantly once a sufficient number of overseas posts were found and settled.

Those ambitious enough to undertake a sea voyage often encountered opposition when soliciting support. Christopher Columbus, for example, was unsuccessful in his attempt to enlist the aid of King John I of Portugal. Spurred on by his determination to test a hypothesis -- that it was possible to reach "the Indies" by sailing west over the open sea -- and confident in his belief that the earth's circumference was smaller than generally supposed by the learned people of the time, he finally received help from Ferdinand and Isabella of Spain, but this only after ten years of debate.

Exploration during the fifteenth and sixteenth centuries was feasible only because Europe possessed the knowledge and skills necessary for long-distance travel. The maritime countries were held in high esteem because of their tradition of capable and dedicated seamanship. Remarkable advances had been made in the fields of cartography and navigation. Renaissance captains were extremely competent men, and European vessels combined the good qualities of the square-sailed trader of the North Sea and the oared galleys and lateen-rigged coasters of the Mediterranean.[3] Moreover, these craft had a superior defense system, with guns firing forward, aft and broadside.

Effective weapons, however, did not ensure protection against ever-present dangers appearing in the form of scurvy, malnutrition, shipwreck and uncertainty. Why, then, did men embark upon these hazardous expeditions?

Undoubtedly the spirit of adventure provided impetus for many, since the increase in pay received by ordinary seamen on voyages of exploration was insignificant compared to the amount offered for a routine trip, and especially since there was little hope for loot or captured treasure. The commanders of the ships may have been motivated by a desire for riches, but history does not indicate that many of the celebrated explorers obtained great wealth as a result of their wanderings. "The trail blazer's reward", as chronicler John Hale puts it, "was in the less tangible form of honor and glory."(4)

For Europeans of the Renaissance the time was auspicious to carry on an active program of exploration. One commonly associates the period with a quickening curiosity about natural phenomena and a growing importance attached to human achievement. People in general were not only willing but anxious to support activities which might have led to new discoveries. Also, with the material progress which came in the fifteenth century, Europe was comfortable enough to have the means to seek greater wealth in the New World.

## III. ADVENT OF THE SPACE AGE

Advancing in time a few centuries, let us focus our attention on developments in the space program. As has been mentioned, sea travel was a familiar experience for men of the Renaissance. Space flight, on the other hand, is totally new in the history of man. Never before has he viewed the earth from a vantage point high above the atmosphere, or felt weightless in a capsule traveling at thousands of miles per hour, or scrutinized the craters of the moon at close range. Never has the urgency of perfect instrument operation and engine performance been stressed to such a degree. And at no other time has an entire nation waited so anxiously for news of the successful completion of a peaceful mission. We can all share the astronauts' experience vicariously and enjoy the exhilaration that comes with each added accomplishment. Arthur Clarke believes that "the increasing knowledge and sense impressions . . . that will result from space travel will have a profoundly stimulating effect on the human psyche."(5)

Fifteenth-century conditions called for new material resources; the situation in which the United States found itself near the midpoint of this century, described by some as lacking in spiritual stimulus and originality, demanded new goals, new challenges, new inspiration. America was restless, eager to learn and do but needing direction. The opening of the space frontier provided an outlet for stifled energies. The challenges of the Space Age awakened anew the spirit of creative daring which is necessary if progress is to be achieved. The scientific revolution of this decade has summoned all our energies and opened new ways for intellectual enrichment. The space program in particular has presented itself as a means for imparting new vitality to an already powerful nation. If wisely executed, it "will become the spearhead for a broad front of courageous and energetic activities in all fields of endeavor of the human mind -- activities which cannot be carried out except in a mental climate of ambition and confidence which such a spearhead can give."(6)

Once again we see government assuming leadership in the business of exploration. The establishment in 1958 of a separate agency to supervise planning and development in the space effort, and the decision to land a man on the moon in the sixties were positive steps designed to ensure the most efficient use of talent and wealth. Government coordinated and systematized the undertaking, just as heads of state organized exploratory expeditions during the Renaissance. Universities provided the manpower for space research, industry solved problems of technology, and an enthusiastic citizenry responded with support. It is interesting to note that equipment required for the sea voyages was already available -- sturdy vessels and navigational aids such as the compass and star-cross; the necessity for developing totally new vehicles and navigation systems did not exist, as it did for the space endeavor.

Unfortunately early in the program imaginative proposals for bold conquest met with opposition and ridicule. Innovation fell prey to the sceptics in the nineteen-fifties, just as creative thought had done so often in the past. When the idea of putting an artificial satellite into orbit was introduced, many considered it a "nice scientific trick" or "a useless stunt".

As it turned out, satellites did orbit the earth and did gather information for the scientist. Furthermore, as a result of the Mercury, Gemini and Apollo projects this country developed a technology which promises to bring diverse returns to numerous areas. Although the space program was not conceived solely on the basis of a material need, commercial benefits are evident and will continue to accrue. Doubtless our national prestige has been enhanced by space spectaculars and will reach a peak when we return men safely from the lunar surface.

The space program is important for all these reasons, and any of them could be used to justify it, but there are even more fundamental motives for our effort to send man to explore the universe. Man-in-space means more than increased civilian returns, a greater degree of national pride, or added military security. It is more significant than advances in science and technology. Man-in-space is the measure of human ability and achievement. It is proof that man is worthy of the praise of Sophocles:

> Numberless are the world's wonders, but none
> More wonderful than man; the stormgrey sea
> Yields to his prows, the huge crests bear him high . . .
> The lightboned birds and beasts that cling to cover . . .
> All are taken, tamed in the net of his mind . . .
> Words also, and thought as rapid as air,
> He fashions to his good use . . .[7]

The courage, creativity and perseverance essential for successful penetration of the outer regions try man's talents to the utmost but also attest his greatness. What man <u>can</u> do, he <u>will</u> do. There is only the question of time.

## IV. MAN AND SPACE

Why do we venture out into the trackless void? Certainly we are thrust into space by the same instinct that carried da Gama, Columbus and Magellan out to sea: the urge to explore and to discover, the impulse to respond to the lure of the unknown.

> Stars scribble on our eyes the frosty sagas
> The gleaming cantos of unvanquished space.[8]

Man strikes out because space is the last frontier to be crossed. Having mapped the earth's surface and probed the ocean's depths, he now turns his gaze to the beckoning skies. He willingly braves the dangers of extreme and hostile environments because they are part of the great adventure.

The Renaissance sailors faced many hazards on their voyages of exploration[9], but the dangers which confront our astronauts are also great. One miscalculation could bring them crashing to the lunar surface; rocket reignition failure would keep them perpetually in orbit; reentry at other than the proper angle might send them hurtling off again into the region above the atmosphere with virtually no chance of returning. Now only men of daring would leave the comfort of this planet to risk the perils of space travel. It may be difficult for some to project into the future, but surely the day will come when earth-to-moon or earth-to-space station trips are not uncommon occurrences.

Throughout the ages the moon has remained a symbol of the unattainable. Now that we are within months of a lunar landing let us set our sights on other targets. The challenge alone makes it worthwhile.

The quest for knowledge, as well as the challenge of nature, motivates man to search the heavens. He will be restless until he sees what lies beyond his horizon. John Glenn, when asked why he volunteered to become a space pioneer, replied: " . . . I feel I still have a fair-sized remnant of the most priceless possession of childhood-curiosity."[10] Without this quality progress is impossible for mankind. Curiosity provided the incentive in the Age of Exploration. Inquiring minds of more recent generations have discovered how to transmit the human voice over telephone wire, how to harness steam to drive powerful engines, how to capture radio waves as they penetrate the atmosphere, how to control the power released by an atom; the present generation will determine how to land on Mars.

The discoveries of the Space Age will produce an increase in scientific and technical knowledge perhaps

unparalleled in history. The space program itself may provide the impetus for a "tremendous resurgence of mind and spirit" and mark the beginning of another great age of reason. Assuredly it will furnish a technological base for developments in the near future. The scientific explorer Fridtjof Nansen describes man's insatiable thirst for knowledge in this way: "The history of the human race is a continuous struggle from darkness toward light. It is therefore of no purpose to discuss the use of knowledge; man wants to know and when he ceases to do so he is no longer man."(11)

Space flight fires the imagination just as it fascinates the mind. It would be a difficult task indeed to count the number of works of the last century that have touched upon the subject of interplanetary travel. The stories by the well-known science fiction writers, Jules Verne, H. G. Wells and Arthur Clarke, would certainly figure in but would hardly make complete an anthology of space literature.

Poets, too, have envisioned travel in the universe. Masefield pictures it thus:

> If I could sail that nothing, I should cross
> Silence and emptiness with dark stars passing;
> Then, in the darkness, see a point of gloss
> Burn to a glow, and glare, and keep amassing,
> And rage into a sun with wandering planets,
> And drop behind; and then as I proceed,
> See his last light upon his last moon's granites
> Die to a night that would be night indeed. . . .(12)

Tennyson wondered about the inhabitants of other worlds long before astronautics was considered a possibility; " . . . the hum of men," he writes,

> Or other things talking in unknown tongues,
> And notes of busy life in distant worlds
> Beat like a far wave on my anxious ear.(13)

Another underlying reason for the decision to aim at the moon and the planets is that we simply want to go there. With our nation enjoying the economic prosperity

which has prevailed for the past many years, it is not unreasonable to believe that we can take part in the space adventure and at the same time satisfy the more immediate and more practical needs of the community. The ancient Egyptians built the pyramids -- massive structures accomplished with impressive technical skill and engineering ability -- to immortalize their king. The medieval French raised their cathedrals as a tribute both to God and to themselves. America can build her spaceships as a proof of her vitality and as a symbol of the creative spirit of her people. Ours will be a legacy not of stone but of stars.

## V. SIGNIFICANCE FOR MAN AND SOCIETY

The significance of the Renaissance voyages of discovery lay in increased knowledge about the earth, the establishment of overseas settlements, and the introduction of new products, new opportunities and new ways of thinking in the Western world.[14] It is too early yet to determine the full impact of what has been called the "space Discovery", but we can comment on the effect it has had to date.

Since the day when the first American satellite was launched into orbit, the scientist has gathered valuable information concerning the earth, the moon, the planets and the interstellar medium. The space program is largely responsible for important advances in the areas of computer technology, systems engineering, life sciences, materials research and communications. Miniature television cameras, dehydrated foods, electronic sensors for hospital use, and ceramic serving dishes highly resistant to extremes of temperature are only a few of the civilian benefits derived from space-related activities.

Economic profit which follows on the attempt to send man on voyages of exploration in the solar system must certainly be considered. However, less tangible gains which may result from the effort may be more significant for society. In the future if the pace of the arms race slackens, and many think that this is likely to occur, the space program may offer an alternative to a huge

national defense effort. Even now the space project shows signs of being able to fulfill the need of which philosopher William James speaks. He says: "What we now need to discover in the social realm is the moral equivalent of war; something heroic that will speak to men as universally as war does and yet will be as compatible with their spiritual selves as war has proved itself to be incompatible."(15) Government could continue to supply to science and stimulus for creative research and support for technological development, but for peaceful, not military, purposes. If countries strive for competence in space, war may be at least temporarily unnecessary.

Although manned earth orbital space stations are already planned for the near future, colonization of the moon and planets will probably not take place for quite a few years. Imagine the excitement, though, if life, or even more important, intelligence were discovered elsewhere in the universe. It is very possible that someday we will come into contact with races more intelligent than our own. The philosophical effect of such findings will truly be profound. Observations made by the Australian scientist Derek Lawden regarding this aspect of the space adventure are worth noting:

> I think that man will see himself as one agent by which the whole universe of matter is slowly becoming conscious of itself. He will cease to feel an alien creature in an indifferent world, but will sense within himself the pulse of the cosmos. He'll become familiar with the marvellous and varied forms which can be assumed by matter . . . and he's certain to develop a feeling of reverence for the awe-inspiring whole of which he's a very small part.(16)

## VI. EPILOGUE

Space flight promises to be a most enriching experience for man. Some predict that the expanded mental horizons that have resulted from developments relating to the exploration of space will initiate a renaissance of the spirit similar to the revival which occurred centuries ago. Already the country as a whole has been

stirred by the space discovery. Space holds the secret of the future:

> Across the seas of space lie the new raw materials of the imagination, without which all forms of art must eventually sicken and die. Strangeness, wonder, mystery, adventure, magic -- these things, which not long ago seemed lost forever, will soon return to the world. And with them, perhaps, will come again an age of sagas and epics such as Homer never knew.(17)

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Attachments
Footnotes
Bibliography

FOOTNOTES

(1) Francis T. Miller, The World in the Air, the Story of Flying in Pictures (New York: G. P. Putnam's Sons, 1930) p. 131.

(2) John R. Hale, Age of Exploration (New York: Time, Inc., 1966), p. 12.

(3) Ibid., p. 14.

(4) Ibid., p. 16.

(5) Arthur C. Clarke, Voices From the Sky (New York: Harper and Row, 1965), pp. 7-8.

(6) U. S. Congress, Senate, Committee on Aeronautical and Space Sciences, Scientists' Testimony on Space Goals, Hearings, 88th Congress, 1st Session, 1963, p. 155.

(7) Sophocles, The Antigone of Sophocles trans D. Fitts and R. Fitzgerald, New York: Harcourt, Brace and Co., 1939, p. 25.

(8) Hart Crane in The Heel of Elohim, Science and Values in Modern American Poetry, ed. H. H. Waggoner (Norman: University of Oklahoma Press, 1950), p. 183.

(9) Hale, op. cit., p. 15.

(10) John Glenn, "Why Go? Astronaut John Glenn's Answer", Man and Space, ed. Lester M. Hirsch, (New York: Pittman Publishing Corporation, 1966), p. 76.

(11) L. V. Berkner, "The Compelling Horizon", The Bulletin of the Atomic Scientists, May 1963, in Man and Space, p. 147.

(12) John Masefield, "Lollington Downs", in The Coming of the Space Age, ed. Arthur C. Clarke (New York: Meredith Press, 1967), p. 295.

(13) Alfred, Lord Tennyson, "Timbuctoo", in The Coming of the Space Age, p. 294.

Footnotes (Cont'd)

(14) Hale, op. cit., p. 11.

(15) William James in Frank Gibney and George C. Feldman, The Reluctant Space-Farers (New York: New American Library, 1965), p. 156.

(16) Derek Lawden in Arthur C. Clarke, Voices From the Sky, p. 10.

(17) Ibid., p. 8.

## SELECTED BIBLIOGRAPHY

Clarke, Arthur C., ed. Man and Space. New York: Time, Inc., 1966.

Clarke, Arthur C., ed. The Coming of the Space Age. New York: Meredith Press, 1967.

Clarke, Arthur C. The Exploration of Space. New York: Harper, 1951.

Clarke, Arthur C. Voices From the Sky. New York: Harper and Row, 1965.

Edwards, I. E. S. The Pyramids of Egypt. Baltimore: Penguin Books, 1961.

Foure, Helene. The French Cathedrals, their Symbolic Significance. Boston: Bruce Humphreys, Inc., 1931.

Gibney, Frank and Feldman, George G. The Reluctant Space-Farers. New York: New American Library, 1965.

Grinsell, Leslie. Egyptian Pyramids. Gloucester: John Bellows Limited, 1947.

Hale, John R. Age of Exploration. New York: Time, Inc., 1966.

Hirsch, Lester M., ed. Man and Space. New York: Pittman Publishing Corporation, 1966.

Holmes, Jay. America on the Moon: the Enterprise of the Sixties. Philadelphia and New York: J. B. Lippincott Company.

Lapp, Ralph. Man and Space, the Next Decade. New York: Harper and Brothers.

Levy, Lillian, ed. Space: Its Impact on Man and Society. New York: W. W. Norton & Company, Inc., 1965.

Mazlish, Bruce. The Railroad and the Space Program, An Exploration in Historical Analogy. Cambridge: The M. I. T. Press, 1965.

Selected Bibliography (Cont'd)

Miller, Francis T. The World in the Air, the Story of Flying in Pictures. New York: G. P. Putnam's Sons, 1930.

Sophocles. The Antigone of Sophocles. trans. D. Fitts and R. Fitzgerald. New York: Harcourt, Brace and Co., 1939.

Van Dyke, Vernon. Pride and Power. Urbana: University of Illinois Press, 1964.

Waggoner, H. H., ed. The Heel of Elohim, Science and Values in Modern American Poetry. Norman: University of Oklahoma Press, 1950.

U. S. Congress, Senate, Committee on Aeronautical and Space Sciences. Scientists' Testimony on Space Goals. Hearings, 88th Congress, 1st Session, 1963.